

Organic Carbon Accumulation and Distribution in the Miocene Monterey Formation of the San Joaquin Basin, California

Amanda Seckington¹ and Richard Behl¹

¹California State University, Long Beach, California

Abstract

The Miocene Monterey Formation records major global changes in the carbon cycle and a transition into an icehouse world. Although significant amounts of organic matter were buried in the Monterey Formation, its role as a carbon sink and its contribution to climate change in the Miocene is poorly defined due to large inter- and intra-basinal variations in depositional environment, with prior studies located predominantly in distal basins with slow sedimentation and significant stratigraphic hiatuses. This study quantifies the amount and distribution of organic carbon sequestered in the Monterey Formation in the San Joaquin basin (SJB), the largest sedimentary basin in California, to assess its impact on global geochemical balances and climate change during the Miocene. We compiled TOC (total organic carbon) data from 151 wells that penetrate the Monterey Formation across the SJB (3.5 times the largest previous public dataset) which illustrate a new pattern of marginal enrichment in TOC. Additionally, we analyzed one well from the Buttonwillow depocenter at very high stratigraphic resolution (~190 samples) to document stratigraphic variation in TOC in association with major-element and trace metal geochemistry to reconstruct paleoredox and paleoproductivity conditions. Insight into these conditions is crucial for understanding the relationship of depositional environments sedimentation, accumulation, and preservation of organic carbon in the borderland setting. These data will be correlated with wells in a proximal-distal transect from the Belridge field to the Buttonwillow depocenter to characterize variation in different water masses. The largest challenge is a lack of adequate dating in SJB.